Rapid Culvert Survey Protocol

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Introduction

Sediment, while necessary for aquatic habitat development, can negatively affect the growth and survival of aquatic organisms if found in excess in streams. Human-related (anthropogenic) land management activities such as timber harvest and Forest roads have been known to deliver sediment to streams.

The Forest has implemented no-harvest streamside buffers, known as PACFISH Riparian Habitat Conservation Area (RHCAs), since 1995 as required by PACFISH. The buffers range from 100-300' on each side of streams within harvest units. The buffers were designed to limit or eliminate sediment delivery to streams that may be generated from within timber harvest units. Field studies conducted on the Central Zone of the Forest between 2008 and 2016 confirmed that no sediment was being delivered to streams from harvest units through the 13 miles of riparian adjacent buffers surveyed (Smith 2016). The buffers therefore are considered very effective at preventing timber harvest-related sediment delivery to streams.

While many roads occur well away from streams, most cross directly cross over streams or intersect streamside riparian zones at some point in their length. Roads within riparian zones can confine stream channels, potentially altering stream flow movement, decreasing streambank stability, and reducing wood recruitment into the stream. Ditchlines that drain roads can direct flow and road surface generated sediment into perennial streams at culvert and bridge crossings. These can lead to a chronic (ongoing) source of sediment delivery to streams and can increase water yield. Culverts that plug with woody material can overtop the road resulting in road failures and delivery of excessive quantities of sediment to downstream areas.

The Forest has identified roads as the most likely anthropogenic source of sediment delivery to streams on Forest-managed lands. As a result, this rapid survey protocol was developed and used in order to quickly identify potential sediment delivery points and propose projects that could eliminate or reduce road-related delivery to streams. The protocol was used in lieu of modeling efforts which require more time, effort, and knowledge of currently available models (WEPP:Road, GRAIP, GRAIP-lite). The models can visually indicate the probability of sediment delivery but cannot prescribe treatments for those sites. Further field review and treatment identification is therefore required after modeling. Given declining budgets and personnel, the rapid protocol was found to be more efficient in identifying road improvement projects (see the *Road Sediment Modeling Results and Comparisons, West Fork Clear Creek Drainage (Hoodoo Forest Plan Prescription Watershed) 2020* document for comparisons of the rapid survey method and other models used on the Forest). The rapid survey protocol was not meant to be used in modeling efforts or to estimate the amount of sediment coming off of roads at crossings. It was simply developed to identify the work needed to reduce potential sediment delivery from roads at stream crossings.

Rapid Culvert Field Survey Protocol

The surveys entail driving to each live water crossing on a given road. Each structure is located, reviewed and tracked with a GPS point.

The following information is collected at each culvert. The GPS point is taken and all other information is written in field notebook. All data is then transferred to the AllForestCrossings2017 geodatabase:

Crossing identifier entered in GPS unit: Road #-culvert number (Ex: 1114-01)

Comments (written in field book then transferred to the geodatabase): comments include existing culvert diameter, recommended culvert diameter if it does not match the bank full width of the stream channel (bank full width plus 2' is usually recommended), any damage to the culvert, whether the inlet is blocked, filled up with material or any other conditions that may indicate potential future failure of the structure, whether the inlet is not in alignment with the stream channel, spill height to help determine if the outlet is a barrier to upstream migration, fill height (estimated), stream characteristics (seep, perennial, dry…), any other information that might be useful in describing the site with regards to sediment delivery or failure potential

Stream Name (or drainage it is located in for small unnamed tributaries)

Proposed Work Type: None (if okay with no issues)/ Replacement/ Clean Inlet/ Clean Outlet/ Remove (proposed)/ Removed (if it's already gone)

Add Cross Drain: Yes or No

Priority for Work: High/Moderate/Low/None (determined while on site and is based on failure risk or need to divert ditchwater away from stream crossing)

Additional information added to the geodatabase after returning from the field (to make spreadsheet sorting and project identification easier- see example below):

Fish Bearing: Yes or No (can be determined at the site or using other Forest data at the office)

Undersized Culvert: Yes or No

Barrier (to fish or amphibians): Yes or No (based on spill height information)

HUC12 name

NEPA project under which the proposed work was conducted

Year of Implementation (once the work is done)

The AllForestXings2017 geodatabase can then be used to display the crossings and their associated data spatially in ArcMap. The geodatabase simplifies the identification of proposed work and allows for tracking of each crossing over time, including any work that occurs there (such as if the culvert was replaced/removed/fixed, under which project NEPA it was cleared, and the year the project was implemented). The geodatabase is located with the Central Zone Fisheries Biologist at the Lochsa Ranger District Office. It also contains some culvert information for the South Zones End of the World Project as

well as culverts throughout part of the North Fork Clearwater drainage (including Orogrande and Orofino Creek).

Example of information contained in the database:

IDENT	COMMENT2	Stream	FISH	Undersi	Barrier	Priority	Work_Type	NEPA_Project	Decision	Implement Year	Add Xdrain	HUC_NAME
470-01	not yet surveyd- as of Feb 2019	Brown Springs Cr			No	Unknown	Unknown					BROWNS SPRING CREEK
470-02	not yet surveyd- as of Feb 2019	Brown Springs Cr			No	Unknown	Unknown					BROWNS SPRING CREEK
286-C53	Brown Springs Creek-need/find data	Brown Springs Cr	No	No	No	Low	Replacement	Brown Springs Culvert Replace	2012			BROWNS SPRING CREEK
286-C50	60" should be 96"; shallow fill	Brown Springs Cr	Yes	No	No	None	Replaced	Clear Cr Culvert Replacement	2011	2012	no	BROWNS SPRING CREEK
1114-05	24" should be 36", outlet 3/4 full- needs cleaned	Brown Springs Cr	No	Yes	No	Moderate	Replacement	Clear Creek Restoration			yes	BROWNS SPRING CREEK
1114-06	24" should be 36", outlet drop w/ minor erosion	Brown Springs Cr	No	Yes	No	Low	Replacement	Clear Creek Restoration			yes	BROWNS SPRING CREEK
1114-07	24"- inlet buried by slump, intermittent stream	Brown Springs Cr	No	No	No	High	Remove	Clear Creek Restoration			no	BROWNS SPRING CREEK
1114C-01	not yet surveyd- as of Feb 2019	Brown Springs Cr			No	Unknown	Remove	Clear Creek Restoration				BROWNS SPRING CREEK
286-C51	24" should be 36" squash; shallow fill	Brown Springs Cr	No	Yes	No	Low	Replacement	Clear Creek Restoration			yes	BROWNS SPRING CREEK
77774-01	52" should be 108", inlet aggradation, mod fill	Brown Springs Cr	No	Yes	Yes	Moderate	Remove	Clear Creek Restoration			no	BROWNS SPRING CREEK
77774-02	no structure, okay, bankfull width 36"	Brown Springs Cr	No	No	No	None	None	Clear Creek Restoration			no	BROWNS SPRING CREEK
77774-03	18" should be 24", 90 deg into pipe, flow over top	Brown Springs Cr	No	Yes	No	Moderate	Replacement	Clear Creek Restoration			no	BROWNS SPRING CREEK
77774B-01	not yet surveyd- as of Feb 2019	Brown Springs Cr			No	Unknown	Remove	Clear Creek Restoration				BROWNS SPRING CREEK
77774B-02	not yet surveyd- as of Feb 2019	Brown Springs Cr			No	Unknown	Remove	Clear Creek Restoration				BROWNS SPRING CREEK
77799-Nopipe	no pipe under road, should be 36" if road used	Brown Springs Cr	No	No	No	None	None	Clear Creek Restoration			no	BROWNS SPRING CREEK
77799-Nopipe	no pipe under road, should be 24" if road used	Brown Springs Cr	No	No	No	None	None	Clear Creek Restoration			no	BROWNS SPRING CREEK

References

Smith, K. 2016. PACFISH Buffer and Temporary Road Monitoring and Miscellaneous Timber Sale Observations Report, Lochsa/Powell Districts, Nez Perce-Clearwater National Forests, December 2016.

Smith, K. 2020. Road Sediment Modeling Results and Comparisons, West Fork Clear Creek Drainage (Hoodoo Forest Plan Prescription Watershed). Nez Perce-Clearwater National Forests, August 2020.